REMARKS

Reconsideration is respectfully requested of the Official Action of November 25, 2002, relating to the above-identified application.

A petition for a one-month extension of time, together with the associated fee, is filed herewith.

Claims 2 and 4 have been cancelled. With entry of this amendment, the claims in the case are 1, 3, and 5 to 20. A fee for an extra independent claim is filed herewith.

The discussion in the Official Action concerning the election/restriction requirement is noted. Applicants reserve the right to file either a divisional application directed to the non-elected invention or to request rejoinder of non-elected claims at such time as there is an indication of allowable subject matter with respect to Claim 1 and the other elected claims.

With respect to the newly-presented claims, Claims 14, 19 and 20 would be considered as being part of the elected invention.

In response to the requirement in the Official Action to file a new Declaration, applicants did respond to that requirement and filed a new Declaration on February 7, 2003.

It is noted that the drawings have been found to be acceptable by the Examiner.

Applicants have noted the Examiner's comment concerning the "intended use" language of Claim 1 and submit that such language further aids in defining the invention and, therefore, applicants intend to retain that language in Claim 1.

It will be noted that all elected claims now recite the method by which the dispersion is made and applicants have noted the comments in the Official Action concerning product-by-

process limitations. As will be apparent from the data presented hereinbelow, applicants are able to demonstrate that the process limitations set forth in the product-by-process claims are meaningful in defining the product of this invention which differs from the prior art cited in the Official Action as a result of the method by which the inventive dispersions of this invention have been prepared.

It will be noted that Claim 2 has been cancelled and, therefore, the objection to Claim 2 set forth in paragraph 6 on page 4 of the Official Action has been rendered moot.

On page 4, in paragraph 7, of the Official Action, Claims 1-4 have been objected to because of the matter of defining the viscosity. Applicants have rewritten Claim 1 to clarify that matter and it is believed that the objection has been overcome.

Similarly, it is believed that the rejection of Claims 1, 10 and 11, under 35 U.S.C. § 112 (second paragraph) as set forth on page 5, in paragraph 9 of the Official Action, has also been overcome and, therefore, reconsideration is respectfully requested.

Applicants confirm that the subject matter of the various claims was commonly owned at the time the inventions were made.

The rejection of Claims 1, 10 and 11 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a), in view of the *Cabot* International Publication WO 00/01539, is traversed and reconsideration is respectfully requested.

As pointed out in the present application, beginning on page 2, the present invention provides an aqueous nanoparticle ceramic agglomerate dispersion which is particularly suitable for ink absorbing layers formed on ink-jet recording media. It has been determined that the manner in which the dispersion is prepared is critically important in being able to achieve the

properties and characteristics as recited in this application. Thus, on page 3, beginning at line 16, it is pointed out that the "conventional" aqueous nanoparticles ceramic agglomerate dispersion is generally prepared by dispersing 1 to 50% of nanoparticles ceramic agglomerates into deionized water using a conventional mixer. However, in accordance with the invention, when this dispersion is treated using ultrasonic homogenizers for a predetermined time or using a jet mill apparatus for a predetermined time, such that ultra high pressure counter jet streams of the dispersion collide with each other, the nanoparticles ceramic agglomerates are rapidly disintegrated in the aqueous medium. The result is the unique nanoparticle dispersion that is defined in Claim 1 of this application.

Applicants respectfully submit that the *Cabot* patent neither anticipates nor renders obvious applicants' contribution to the art. Thus, the *Cabot* development clearly requires a first and second group of particles in order to achieve their intended result. This is clearly pointed out in the *Cabot* document. See, for example, on page 27 of the *Cabot* document, with reference to "Comparative Example 1A" and "Comparative Example 2A." In those two comparative examples, only one type of particle population is used. The results shown by *Cabot* demonstrate that they are unable to achieve the results using a single population of particles and, therefore, had to resort to the use of the dual population of particles.

Applicants have determined that their invention does not require the presence of the second component. Moreover, even if a second component were not included in the *Cabot* composition, the resulting dispersion would not have the properties necessary to achieve the intended result by *Cabot* as shown by Comparative Examples 1A and 2A, for example.

Applicants note that *Cabot* discloses that their particles can be one or more metal oxides such as silica, alumina, titania, and the like. It is important to note, however, that the particles used in the aqueous dispersions of the present invention have been modified by the high pressure counter jet stream in which the particles collide with each other. This is not shown by *Cabot* and would not be considered obvious by persons skilled in the art as there is no hint or teaching to modify the *Cabot* process in such a way as to readily arrive at applicants' invention. No reason, suggestion or motivation has been described in the Official Action whereby a person skilled in the art would change any of the procedures of the *Cabot* system in order to arrive at applicants' claimed invention.

The Official Action alleges that the range for particle size and particle size distribution and viscosity in applicants' claims substantially overlap with what is shown by *Cabot*. However, the comparison with *Cabot* is misleading because the *Cabot* particles and the resulting dispersion have not been produced under the same conditions as set forth in Claim 1. In this regard, attention is invited to Table 1 of the present application which appears on page 8 of the application. The data shown under the headings "Viscosity" and "Average Diameter" were measured under completely the same conditions for both dispersions. Thus, examples 1-15 of the Conventional Aqueous Ceramic Dispersion in Table 1 were prepared by dispersing the nanoparticle powders of silica, alumina and titania, respectively, into deionized water in a bead mill with stirring. Thus, particles of silica, alumina and titania, respectively, as the pyrogenic metal oxide, were finely milled and the results are commensurate with *Cabot*'s particles.

On the other hand, the samples 1-15 of the "Aqueous Ceramic Dispersion" in Table 1 were prepared by subjecting aqueous ceramic dispersions 1-15 to a jet mill apparatus. The

results clearly show that there is a substantial difference between the characteristics of viscosity and average particle size when the dispersion is produced in accordance with the present invention as compared to the conventional aqueous ceramic dispersion which is representative of the prior art.

Included herein is a copy of a "Modified Table 1" provided by applicants showing that after the jet mill treatment the viscosity value was lowered less than 33% and the average diameter value lowered less than 5%. These experimental results clearly show that applicants' dispersions are completely different from those described by *Cabot* which have not been subjected to a strong pulverizing process. Moreover, *Cabot* fails to teach one of ordinary skill in the art that such improvements could be obtained by the ultra-high pressure counter jet stream treatment.

For the reasons set forth above, it is respectfully submitted that the rejection of Claims 1, 10 and 11 under 35 U.S.C. § 102(a) and/or 103(a) is not well founded and should be withdrawn. For the same reasons, applicants submit that the newly presented Claims 14, 19 and 20 are patentable over the cited prior art.

The rejection of Claims 1, 10 and 11 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a), in view of *Liu* (US 5,958,168) is traversed and reconsideration is respectfully requested.

Applicants' invention has already been summarized above and the remarks made there apply here as well.

It should be clear that the aqueous ceramic dispersions of the present invention are prepared in a particular way which is now recited in Claim 1. The counter current collisions of a

jet stream as claimed in Claim 1 gives a stronger impact to raw material particles than the one-way collision in the process disclosed by *Liu*. Accordingly, applicants respectfully submit that the particles obtained by each process are different in their physical structure and chemical properties. Applicants have been unable to obtain samples of *Liu*'s dispersion and, therefore, cannot directly prove the difference.

Applicants have attempted to compare the particle size distribution curve from the data disclosed by *Liu* with the curve measured from applicants' examples. Thus, the attached Figures 1-5 have been presented for this purpose. Figures 1 and 2 are the size distribution curves of dispersions A and C which are simulated by the data of examples III-1 and III-4 of *Liu*, respectively.

Figure 1 shows that the value of a ratio (Peak width at the half height/Peak height) is 0.91 which does not meet the requirements of present Claim 1. That is to say, a maximum height of 0.7 or less.

In the case of Figure 2 in which the particle was more finely pulverized, though the value of the above ratio (0.54) meets the requirements of present Claim 1, the distribution pattern is completely different from the normal distribution pattern. This means that in an auxiliary insulating layer containing such nanoparticles inorganic agglomerates have a broad size distribution, and larger agglomerates on the ink absorbing layer will absorb many ultrafine ink droplets. The result will be that the ultrafine ink droplets cannot be held at discharge position and bleed from the discharge position. Thus, the image printed on an ink jet recording medium will not be sharp and clear.

Figures 3, 4 and 5 show the normal shaped curve obtained in accordance with the examples of the present invention and clearly demonstrate the differences between applicants' invention and that of *Liu*.

Consequently, applicants respectfully submit that the *Liu* document neither anticipates nor renders obvious applicants' claimed invention.

For reasons set forth above, applicants submit that Claims 14, 19 and 20, similarly are not rendered unpatentable by the *Liu* reference.

Applicants have made an earnest effort to advance prosecution of this application and request favorable consideration by the Examiner at his earliest convenience.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: _____
Robert G. Weilacher, Reg. No. 20,531

Suite 3100, Promenade II
1230 Peachtree Street, N.E.
Atlanta, Georgia 30309-3592
Telephone: (404) 815-3593
Facsimile: (404) 685-6893

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Modified TABLE 1

		Viscosity (mPa·s)			Average Diameter (μ m)		
		V2	V1	V2/V1	D2	D1	D2/D1
1	SiO_2	10	33	0.30	0.06	1.50	0.040
2	〃	30	95	0.31	0.08	3.04	0.026
3	〃	50	181	0.27	0.10	5.20	0.019
4	〃	100	335	0.30	0.20	10.32	0.019
5	〃	200	841	0.23	0.29	20.45	0.014
6	Al_2O_3	10	37	0.27	0.07	2.02	0.034
7	〃	30	97	0.31	0.09	5.00	0.018
8	〃	50	169	0.30	0.16	10.03	0.015
9	〃	100	388	0.26	0.20	19.12	0.010
10	〃	200	765	0.26	0.25	29.28	0.008
11	TiO_2	10	30	0.33	0.05	1.09	0.046
12	〃	30	79	0.38	0.10	3.00	0.033
13	〃	50	221	0.23	0.16	10.52	0.015
14	〃	100	398	0.25	0.21	15.06	0.014
15	〃	200	820	0.24	0.30	23.04	0.013

- V1 : Viscosity of Aqueous Ceramic Dispersion of Present Invention after the jet-mill treatment of Conventional Aqueous Ceramic Dispersion
- V2 : Viscosity of Conventional Aqueous Ceramic Dispersion without the jet-mill treatment
- D1 : Average Dimeter of Aqueous Ceramic Dispersion of Present Invention after the jet-mill treatment of Conventional Aqueous

Fig.1: Size Distribution Curve of Dispersion A which is simulated by the data of Example III-1 of Liu et al, US 5,958,168

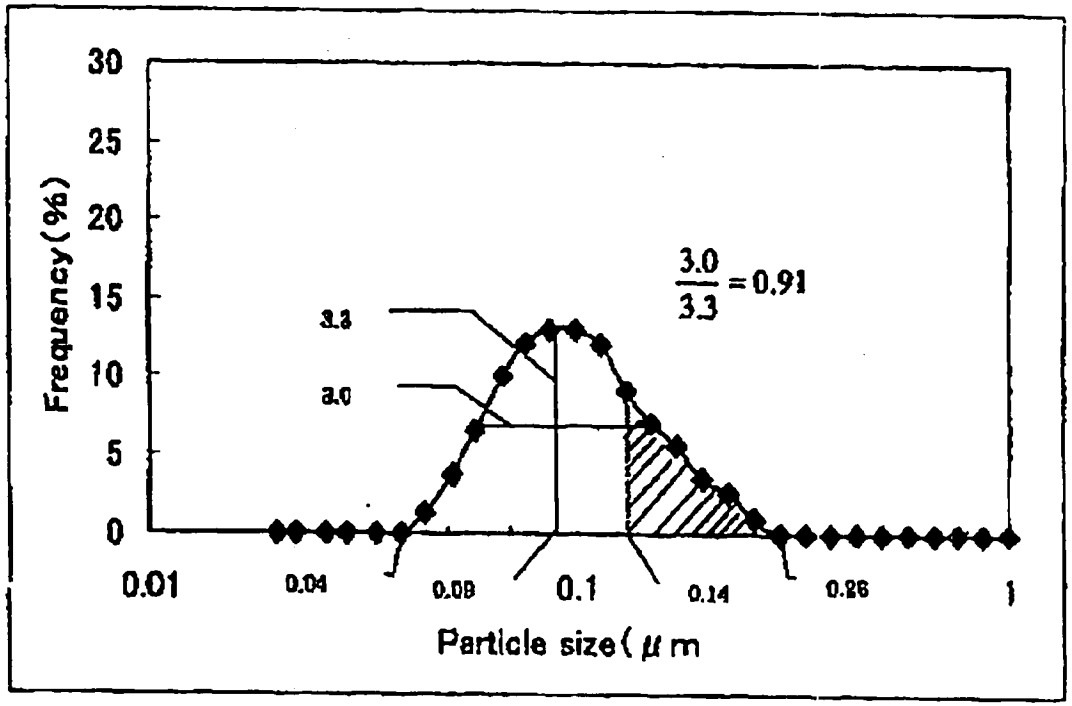
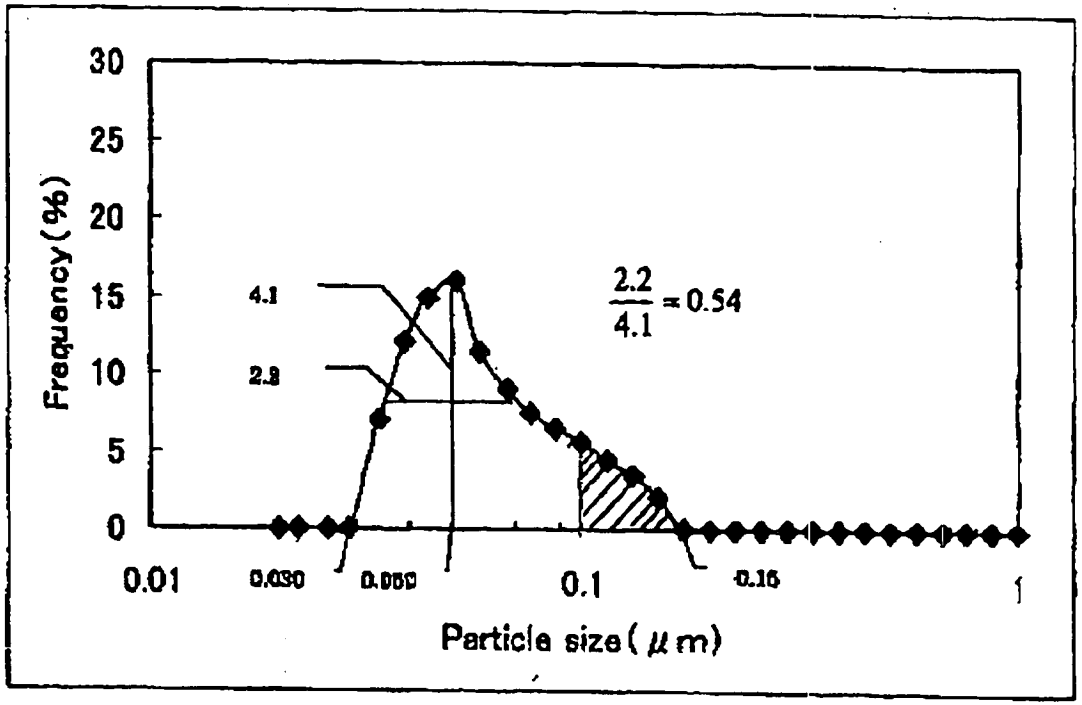


Fig.2: Size Distribution Curve of Dispersion C which is simulated by the data of Example III-4 of Liu et al, US 5,958,168



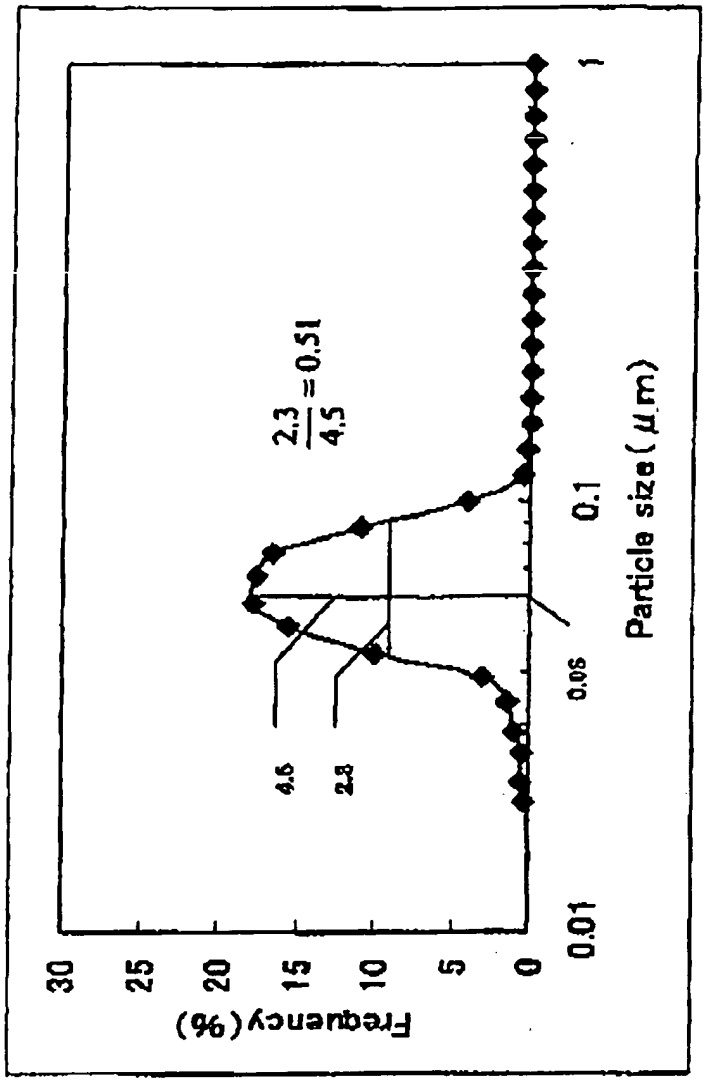


Fig.3: Size Diatribution Curve of No.1 sample of TABLE 1 which was experimentally measured

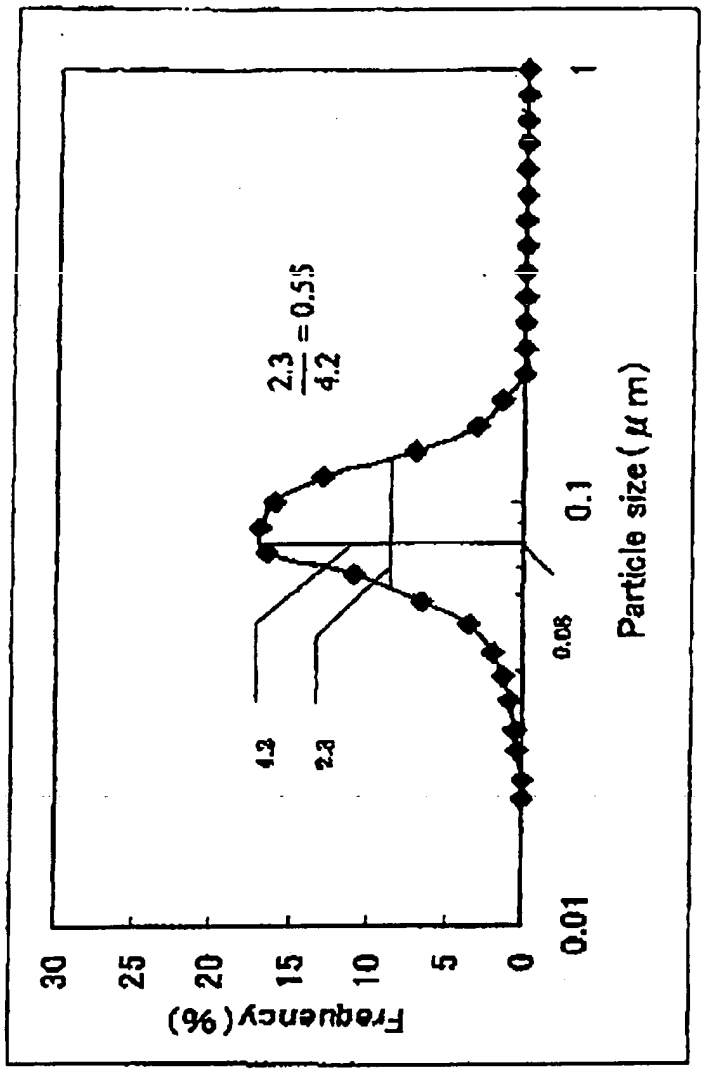


Fig.4: Size Distribution Curve of No.2 sample of TABLE 1 which was experimentally measured

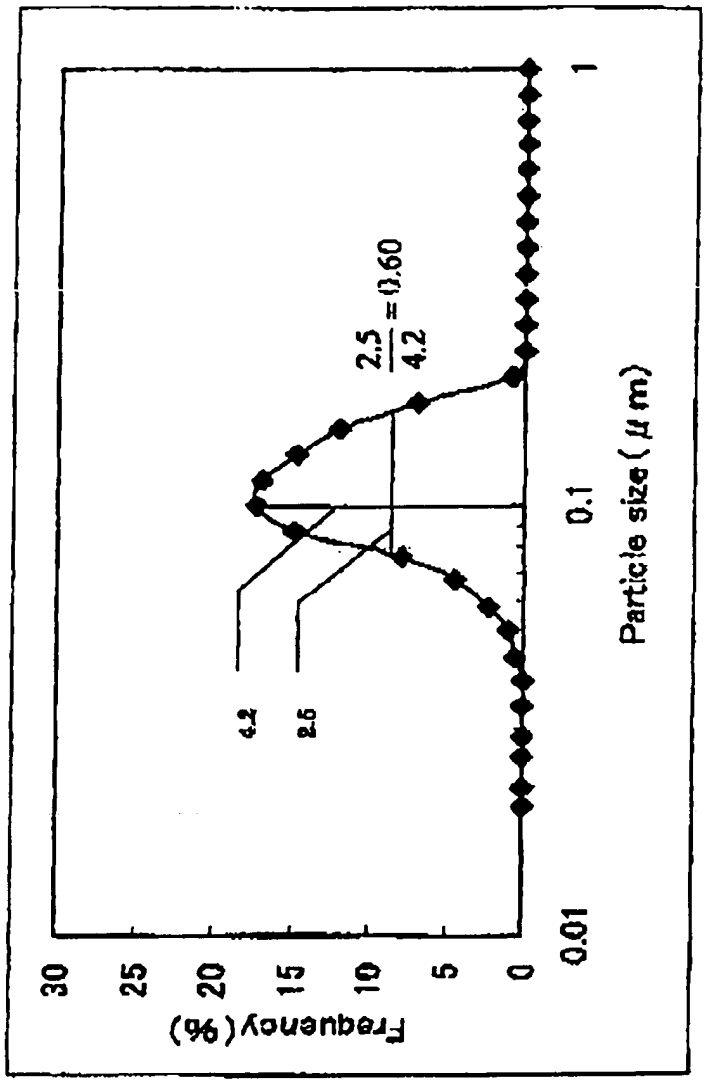


Fig.6: Size Distribution Curve of No.3 sample of TABLE 1 which was experimentally measured

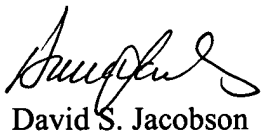
that the search was made of U.S. patents in the United States Patent and Trademark Office;

d) a copy of each reference discovered during the search and deemed to be most closely related to the claimed invention has been previously made of record in Information Disclosure Statements filed January 21, 2003 and February 14, 2003; and

e) a detailed discussion of the attached references and how the claimed subject matter is patentable over the references is attached hereto.

The statement regarding the search and the detailed discussion are contained in a document entitled "Search Statement and Detailed Discussion".

Respectfully submitted,



David S. Jacobson
Reg. #39,235
Attorney for Applicant(s)

65 Woods End Road
Stamford, CT 06905
(203) 329-1160

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